

$x_1: t \in \mathbb{R}^+$
 $x_2: zh \in \mathbb{R}^1$
 $x_3: \text{б/е/м/а/ з/о/г/а}$

$\exp(\theta^{(3)} x_{3i} + \theta^{(2)} x_{2i} + \theta^{(1)} x_{1i} + \theta^{(0)})$

$\begin{matrix} \text{зима} \\ \text{весна} \\ \text{лето} \\ \text{осень} \end{matrix}$

$\exp(\theta^{(0)} + \theta^{(1)} t + \theta^{(2)} zh + \theta^{(3)} x_3 + \theta^{(4)} x_4 + \theta^{(5)} x_5 + \theta^{(6)} x_6)$

$x_3, x_4, x_5, x_6 \in \mathbb{R}$

$z = \theta x$

$t \in \mathbb{R}$
 $zh \in \mathbb{R}$

$y - \text{б/е/м/а/ з/о/г/а}$

$\begin{matrix} 1 & 0 & 1 & 0 & 0 & 1 \\ \text{зима} & \text{весна} & \text{лето} & \text{осень} & & \end{matrix}$

$\exp(\theta^{(k)} x_i)$

$\frac{1}{N} \sum_{i=1}^N \exp(\theta^{(1)} x_i)$

$\exp(\theta^{(0)} x_0 + \theta^{(1)} x_1 + \dots)$

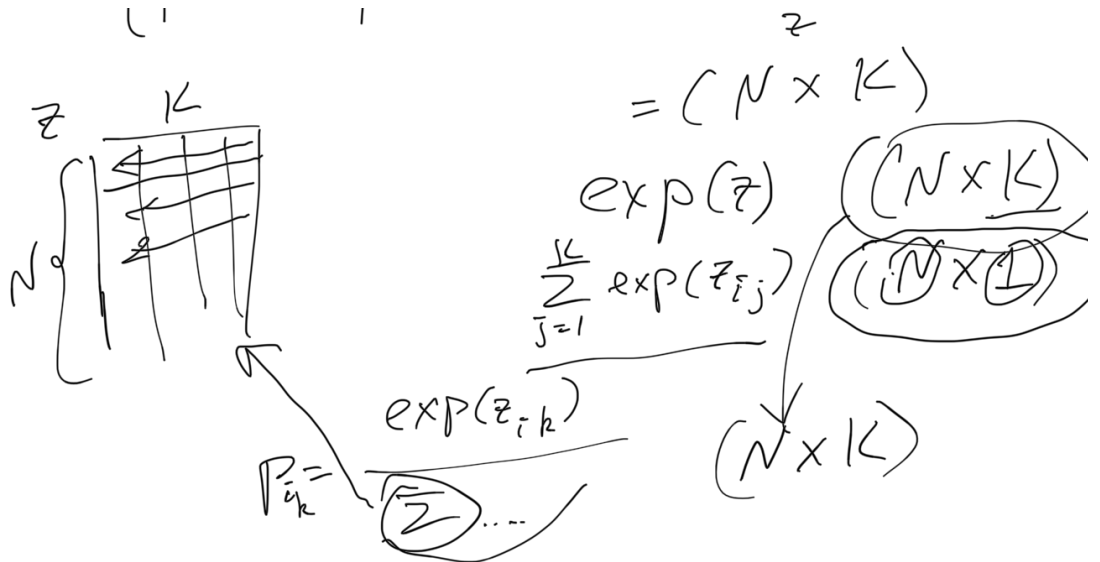
$X \cdot \theta = z$

$X \cdot \theta^{(k)} = z^{(k)}$

$\exp(z^{(k)})$

$X \cdot \theta = z$

$(N \times f) \cdot (f \times K) =$



$$P_{ik}^z = \frac{\exp(z_{ik})}{\sum_{j=1}^K \exp(z_{ij})}$$

Dimensions: z_{ik} is $(N \times K)$, $\exp(z_{ik})$ is $(N \times K)$, and P_{ik} is $(N \times K)$.

$$\ell(\hat{y}, y) = - \sum y \ln \hat{y}$$

y ($N \times K$)

$\hat{y} = \hat{P}$ ($N \times K$)

y

| | | | |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 |

\hat{P}

| | | | |
|-----|-----|-----|-----|
| 0.2 | 0.2 | 0.3 | 0.3 |
| ... | ... | ... | ... |

L_n

model

| | A | B | C | |
|---|-----|-----|-----|-----|
| A | 600 | 70 | 30 | 700 |
| B | 20 | 170 | 10 | 200 |
| C | 0 | 0 | 100 | 100 |

gt

$$P_A = \frac{TP_A}{TP_A + FP_A}$$

$$TP_A = 600$$

$$FP_A = 20$$

$$P_A = \frac{600}{600 + 20} = 96.8\%$$

$$P_B = \frac{TP_B}{TP_B + FP_B}$$

$$R_A = \frac{TP_A}{TP_A + FN_A}$$

$$TP_B = 170$$

$$FP_B = 70 + 0$$

$$P_B = \frac{170}{170 + 70} = 70,8\%$$

$$TP_A = 600$$

$$FN_A = 70 + 30$$

$$R_A = \frac{600}{600 + 100} = 85,7\%$$

$$R_B = \frac{170}{170 + 20 + 10} = 85\%$$

$$R_c = \frac{100}{100} = 100\%$$

$$P_c = \frac{100}{140} = 71,4\%$$